# Attachment A

## Proposed Regulations

Title 13, California Code Regulations, Section 1971, Engine Manufacturer Diagnostic System Requirements for 2007 and Subsequent Model-Year Heavy-Duty Engines (EMD)

§1971. Engine Manufacturer Diagnostic System Requirements--2007 and Subsequent Model-Year Heavy-Duty Engines

**(a) PURPOSE**

The purpose of this regulation is to establish requirements for engine manufacturer diagnostic systems (EMD systems) that are installed on 2007 and subsequent model-year engines and other powertrain components certified for sale in heavy-duty vehicles in California. The EMD systems, through the use of a computer(s), shall monitor emission systems in-use for the actual life of the engine and shall be capable of detecting malfunctions of the monitored emission systems, illuminating a malfunction indicator light (MIL) to notify the vehicle operator of detected malfunctions, and storing diagnosis information regarding the detected malfunctions.

**(b) APPLICABILITY**

Except as specified elsewhere in this regulation (title 13, CCR section 1971), all 2007 and subsequent model-year on-road heavy-duty engines shall be equipped with an EMD system and shall meet all applicable requirements of this regulation (title 13, CCR section 1971).[1] For purposes of this regulation, "engine" shall refer to powertrain components (e.g., engine, transmission, hybrid) that are utilized in heavy-duty vehicles.

**(c) DEFINITIONS**

(1) "Actual life" refers to the entire period that an engine is operated on public roads in California up to the time an engine is retired from use.

(2) "Deactivate" means to turn-off, shutdown, desensitize, or otherwise make inoperable through software programming or other means during the actual life of the engine.

(3) "Functional check" for an output component or system means verification of proper response of the component and system to a computer command.

(4) "Heavy-duty vehicle" means any motor vehicle having a gross vehicle weight rating greater than 14,000 pounds.

(5) "Key on, engine off position" refers to a vehicle with the ignition key in the engine run position (not engine crank or accessory position) but with the engine not running.

(6) "Malfunction" means any deterioration or failure of a component that causes the performance to be outside of the applicable limits in section (e).

(7) "Manufacturer" includes producers of engines, transmissions, other powertrain components, chassis, or coaches for use in heavy-duty vehicles and includes others involved in the assembly or modification of heavy-duty vehicles prior to being registered for on-road use.

(8) "On-road heavy-duty engine" means an engine certified to the requirements of title 13, CCR sections 1956.1 or 1956.8 or a powertrain component designed for use with such an engine.

(9) "Rationality fault diagnostic" for an input component means verification of the accuracy of the input signal while in the range of normal operation and when compared to all other available information.

[1] Unless otherwise noted, all section references refer to section 1971 of title 13, CCR.

**(d) GENERAL REQUIREMENTS**

(1) The EMD System.

(A) If a malfunction is present as specified in section (e), the EMD system shall detect the malfunction.

(B) The EMD system shall provide diagnostic information to service and repair technicians to identify detected malfunctions.

(C) The EMD system shall be designed to operate, without any required scheduled maintenance, for the actual life of the engine in which it is installed and may not be programmed or otherwise designed to deactivate based on age and/or mileage of the vehicle during the actual life of the engine. This section is not intended to alter existing law and enforcement practice regarding a manufacturer's liability for an engine beyond its useful life, except where an engine has been programmed or otherwise designed so that an EMD system deactivates based on age and/or mileage of the engine.

(2) MIL Requirements.

(A) MIL Specifications.

1. The MIL shall be of sufficient illumination and location to be readily visible under all lighting conditions. The MIL, when illuminated, shall display a phrase or icon determined by the manufacturer to be likely to cause the vehicle operator to seek corrective action. In lieu of a dedicated MIL, manufacturers may utilize an existing warning light(s) to also satisfy the requirements of the MIL.

2. The MIL shall illuminate in the key on, engine off position before engine cranking to indicate that the MIL is functional. This functional check of the MIL is not required during vehicle operation in the key on, engine off position subsequent to the initial engine cranking of an ignition cycle (e.g., due to an engine stall or other non-commanded engine shutoff).

(B) Illuminating the MIL.

Once a malfunction has been detected, the EMD system shall illuminate the MIL in accordance with the manufacturer's existing practices for notifying vehicle operators and service technicians.

(C) Extinguishing the MIL.

Once the MIL has been illuminated, it may be extinguished upon the EMD system determining that the malfunction is no longer present provided no other malfunction has been detected that would independently illuminate the MIL according to the requirements outlined above.

(3) Monitoring Conditions.

Manufacturers shall define monitoring conditions for detecting malfunctions identified in section (e) and for determining if malfunctions no longer exist.

**(e) MONITORING REQUIREMENTS**

(1) FUEL SYSTEM MONITORING

(A) Requirement: The EMD system shall monitor the fuel delivery system.

(B) Malfunction Criteria: If the engine is equipped with feedback control of the fuel pressure, the EMD system shall detect a malfunction of the fuel system when the

feedback control system has used up all of the adjustment allowed by the manufacturer and cannot achieve the desired fuel pressure.

(2) EXHAUST GAS RECIRCULATION (EGR) SYSTEM MONITORING

(A) Requirement: The EMD system shall monitor the EGR system on engines so-equipped.

(B) Malfunction Criteria:

1. Low Flow: The EMD system shall detect a malfunction of the EGR system when the system has reached its control limits such that it cannot increase EGR flow to achieve the commanded flow rate.
2. High Flow: The EMD system shall detect a malfunction of the EGR system when the system has reached its control limits such that it cannot reduce EGR flow to achieve the commanded flow rate.

(3) PARTICULATE MATTER (PM) TRAP MONITORING

(A) Requirement: The EMD system shall monitor the PM trap on engines so-equipped.

(B) Malfunction Criteria:

1. Excessive Backpressure: The EMD system shall detect a malfunction when the PM trap fails to regenerate, clogs, or otherwise malfunctions such that it causes the backpressure in the exhaust system to exceed the manufacturer's specified limits for operation.
2. Missing substrate: The EMD system shall detect a malfunction if either the PM trap substrate is completely destroyed, removed, or missing, or if the PM trap assembly is replaced with a straight pipe.

(4) EMISSION-RELATED ELECTRONIC COMPONENT MONITORING

(A) Requirement: The EMD system shall monitor for malfunction any electronic powertrain component/system that either provides input to (directly or indirectly) or receives commands from the on-board computer(s), and: (1) is defined by the manufacturer as emission-related, or (2) is used as part of the diagnostic strategy for any other emission-related monitored system or component.

(B) Malfunction Criteria:

1. Input Components: Where determined by the manufacturer to be feasible given existing hardware and software, the EMD system shall detect malfunctions of input components caused by a lack of circuit continuity, out-of-range values, and rationality faults.
2. Output Components/Systems: Where determined by the manufacturer to be feasible given existing hardware and software, the EMD system shall detect a malfunction of an output component/system when proper functional response of the component and system to computer commands does not occur or when a lack of circuit continuity or circuit fault occurs (e.g., short to ground or high voltage).

**(f) CERTIFICATION**

The Executive Officer shall grant certification for the EMD system upon the manufacturer submitting the following certification information:

(1) A description of the functional operation of the EMD system.

(2) A listing of all electronic powertrain input and output signals (including those not monitored by the EMD system) that identifies which signals are monitored by the EMD system.

**(g) DEFICIENCIES**

The Executive Officer may certify EMD systems installed on engines even though the systems do not comply with one or more of the requirements of title 13, CCR section 1971. In granting the certification, the Executive Officer shall consider the following factors: the extent to which the requirements of section 1971 are satisfied overall based on a review of the engine applications in question, the relative performance of the resultant EMD system compared to systems fully compliant with the requirements of section 1971, and a demonstrated good-faith effort on the part of the manufacturer to: (1) meet the requirements in full by evaluating and considering the best available monitoring technology; and (2) come into compliance as expeditiously as possible. Manufacturers shall not be subject to limitations on the number of granted deficiencies nor subject to fines for granted deficiencies.

NOTE: Authority cited: Sections 39600, 39601, 43000.5, 43013, 43018, 43100, 43101, and 43104, Health and Safety Code. Reference: Sections 39002, 39003, 39010-39060, 39515, 39600-39601, 43000, 43000.5, 43004, 43006, 43013, 43016, 43018, 43100, 43101, 43102, 43104, 43105, 43105.5, 43106, 43150-43156, 43204, 43211, and 43212, Health and Safety Code.